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**Refining temperature profile from GEOKOMPSAT-2A using ERA5
reanalysis data and a light gradient boosting machine over East Asia**

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The temperature profile contains important information across various vertical levels of the atmosphere. GEO-KOMPSAT-2A (GK2A) provides this temperature profile based on numerical weather prediction (NWP) and performs bias correction using a radiative transfer model. In addition to the corrected temperature profile generated by the GK2A algorithm, we explored further refinements using ERA5 reanalysis data and a Light Gradient Boosting Machine (LGBM) learning approach. Utilizing the brightness temperatures from GK2A and additional auxiliary variables, we trained the proposed LGBM model using historical ERA5 temperature profiles as the target. As a result, the LGBM model is capable of generating ERA5-like temperature profiles for operational use.